S/040/63/027/001/013/027
D251/D308

AUTHORS: Levitin, L.B., Skuridin, G.A. and Stanyukovich, K.P. (Moscow)

TITLE: On the oscillations of an elastic inhomogeneous layer with a curvilinear boundary lying on an elastic inhomogeneous half-space

PERIODICAL: Prikladnaya matematika i mekhanika, v. 27, no. 1, 1963, 116-125

TEXT: An approximate solution is sought of the above problem which is of considerable importance to seismic investigations. The elastic layer is taken to be of variable height, and transverse elastic oscillations in a vertical plane through the layer are discussed. The boundary conditions are expressed in terms of Lame parameters. The solutions of equations of the oscillations are sought by means of the asymptotic method. It is shown that the solutions will be of the form

$$u_1(x,v,t) = A(x,v,\omega)\cos[\alpha(x)(v \mp h)]\, e^{i\omega S(x,t)} \qquad (1.6)$$

Card 1/2

S/040/63/027/001/013/027
D251/D308

On the oscillations ...

$$u_2(x,v,t) = B(x,v,\omega)\, e^{-\beta(x)v_c i\omega S(x,t)} \qquad (\beta(x) > 0) \qquad (1.7)$$

where $\alpha(x)$, $\beta(x)$ and $S(x,t) = t - \psi(x)$ are real functions. Series are sought which will give asymptotic values for $A(x,v,\omega)$ and $B(x,v,\omega)$, and hence an infinite system of second-order differential equations is obtained. A suitable solution is found by the usual recurrence-relationship methods and from the boundary conditions. The general form of the approximating functions is demonstrated by induction methods, and contains polynomials, trigonometrical functions, and rational functions and their derivatives. The geometrical optics of the propagation of Love's waves is discussed in connection with the above solution, and an alternative method of solving the basic equation is given. There are 2 figures.

SUBMITTED: October 30, 1962

Card 2/2

LEVITIN, L.B.

AID Nr. 993-7 19 June

MAXIMUM INFORMATION CARRIED BY ELECTROMAGNETIC FIELD (USSR)

Lebedev, D. S., and L. B. Levitin. IN: Akademiya nauk SSSR. Doklady, v. 149, no. 6, 21 Apr 1963, 1299-1302. S/020/63/149/006/010/027

An analysis of the quantity of information that can be carried by an electromagnetic field has been made. A signal consisting of photons with an identical state of photons with an identical state of polarization and direction of the wave vectors is emitted by a transmitter and received by an ideal analyzer with a certain mean absorption power. The analyzer, which performs a precise spectral decomposition of the signal ensemble, consists of oscillators with a negligibly small natural linewidth. Formulas are derived expressing the maximum information that can be carried in an electromagnetic channel by a signal per unit time for signals with discrete energy spectra, continuous energy spectra, and narrow bandwidth. Limit cases of minimum energy required to transmit information are calculated. [BB]

Card 1/1

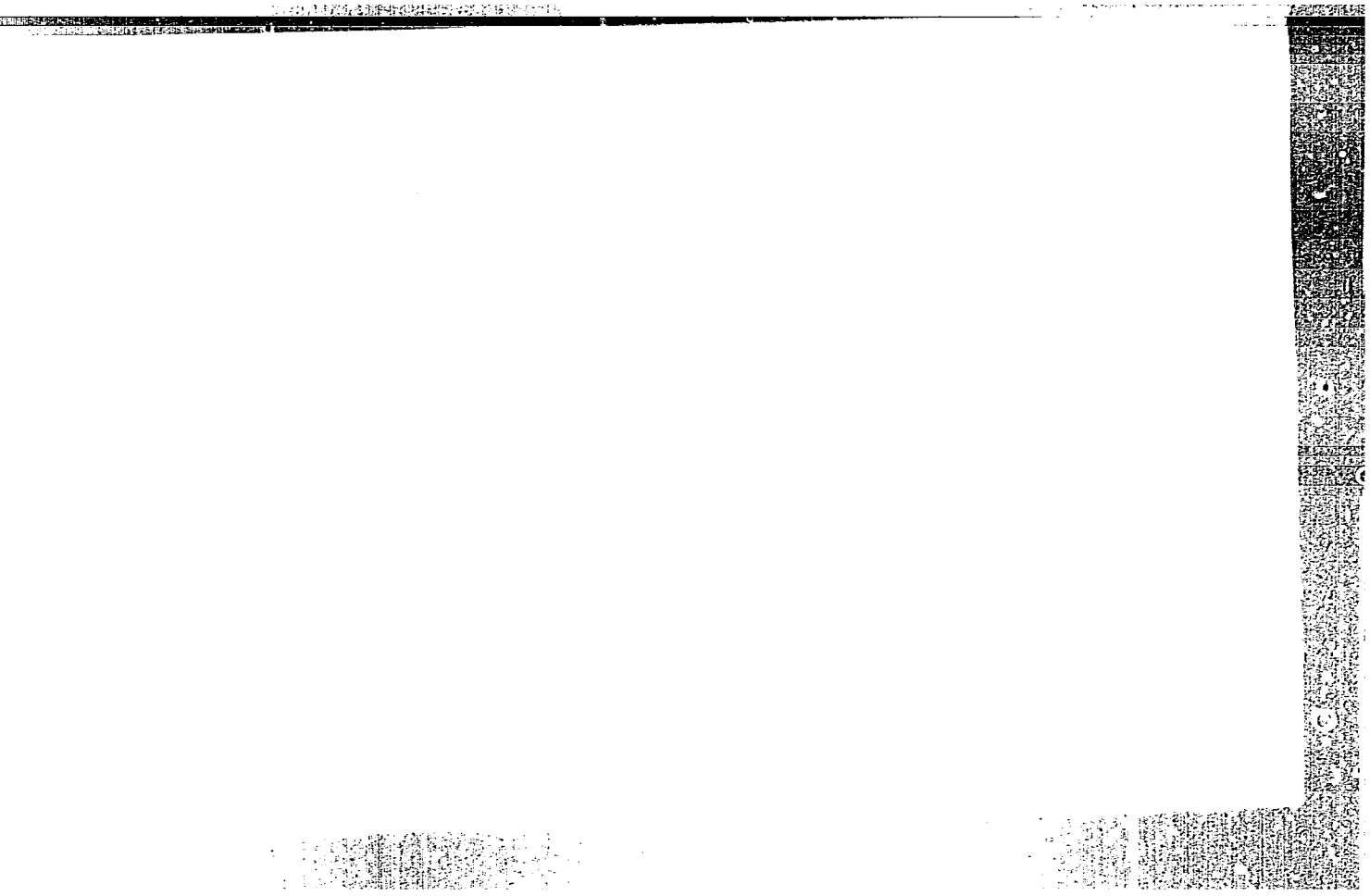
L 40285-65 EWT(1)/EEC(t) Pg-4/Pt-4/Pl-4 GG/LH/

ACCESSION NR: AT4049767 S/2945/64/000/016/0005/0020

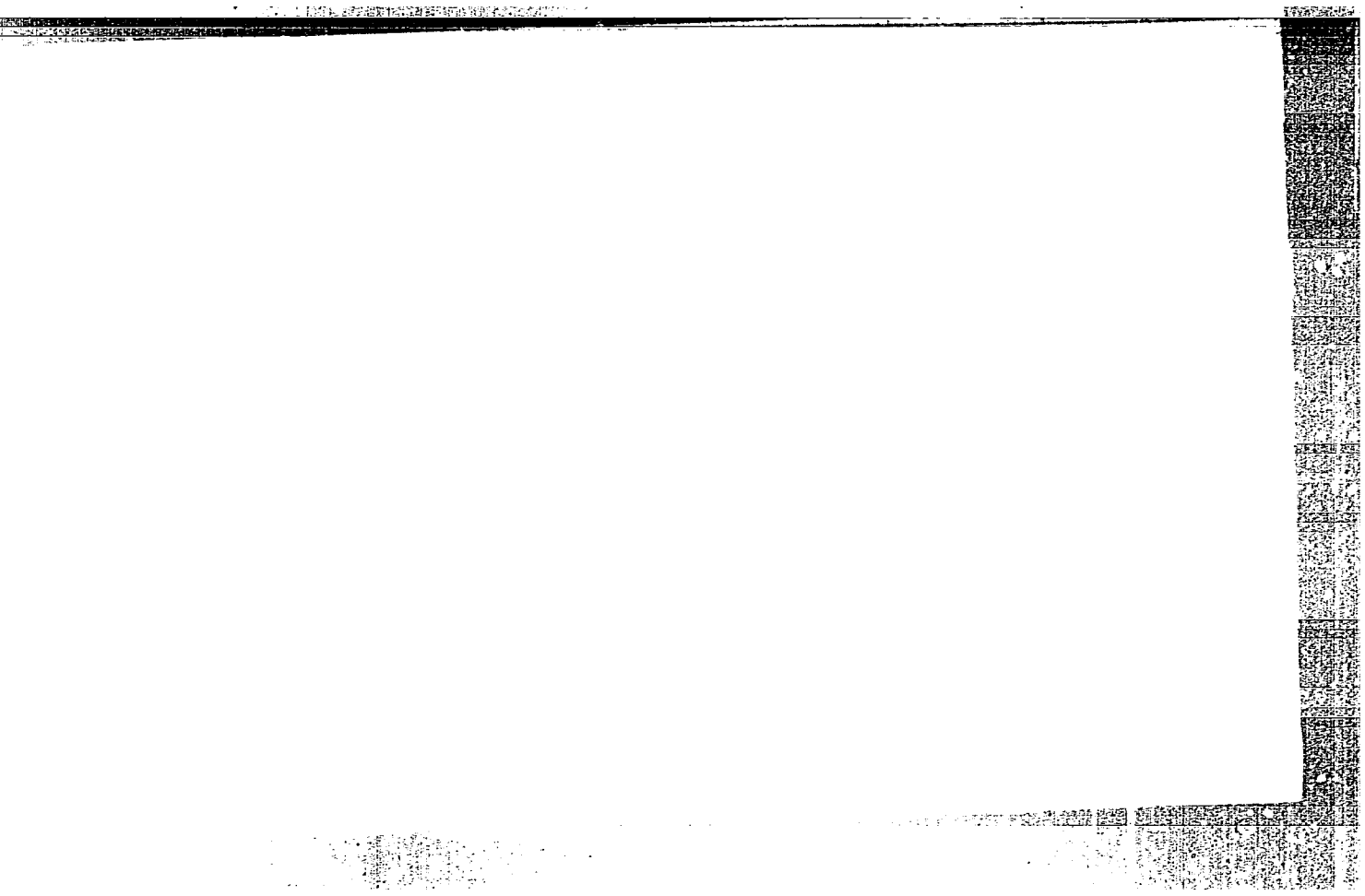
41
36

AUTHOR: Lebedev, D.S.; Levitin, L.B.

Transfer of information by an electromagnetic field



APPROVED FOR RELEASE: 07/12/2001 CIA-RDP86-00513R000929620014-8"



APPROVED FOR RELEASE: 07/12/2001 CIA-RDP86-00513R000929620014-8"

L 33242-66 EWT(d)/FSS(2)

ACC NR: AP6005865 SOURCE CODE: UR/0406/65/001/003/0071/0080

AUTHOR: Levitin, L. B.

ORG: None

TITLE: Information transfer in an ideal photon channel

SOURCE: Problemy peredachi informatsii, v. 1, no. 3, 1965, 71-80

TOPIC TAGS: information transfer, photon emission, electromagnetic signal, data transmission

ABSTRACT: The author investigates a "three dimensional" photon information transmission channel, i.e., an electromagnetic channel with a spatial variation of the wave vectors. Let an electromagnetic signal with the average power of P and thermal emission (noise) of the temperature T_1 be incident on an area S. The source of emission is visible from every point of the area S at the spatial angle Ω. (It will be assumed that the point incidence is normal and that $\Omega/4\pi \ll 1$. Then the result will depend only on the magnitude and not on the form of the spatial angle). It is also assumed that the conditions of justification for the approximation of the geometric optics are satisfied. The author is interested in the question of information which may be transmitted in a unit of time under the conditions listed, i.e., the transmission capacity of such a channel. The transmitter and the receiver are both considered ideal. The author shows the equivalency of the transmission of information by means of representation in momentum space and by means of representation in the ordinary sense, with variations in time.

UDC 621.391.63

Card 1/2

L 33242-66

ACC NR: AP6005865

The author is grateful to M. Ye. Gertsenshteyn for interest and discussion of the work and to D. S. Lebedev for constant support and attention to the work. Orig. art. has: 23 formulas and 3 figures.

SUB CODE: 09, 17 / SUBM DATE: 16May64 / ORIG REF: 005 / OTH REF: 007

Card 2/2

ACC NR: AR7004280 SOURCE CODE: UR/0274/66/000/011/A005/A005

AUTHOR: Levitin, L. B.

TITLE: Information transfer by thermal radiation

SOURCE: Ref. zh. Radiotekhnika i elektrosvyaz', Abs. 11A38

REF SOURCE: Sb. 2-ya Vses. konferentsiya po teorii kodir. i yeye prilozh. Sekts. 5. Ch. 2. M., b, g., 49-55

TOPIC TAGS: information theory, information transmission, thermal radiation

ABSTRACT: An electromagnetic channel of information transmission is investigated in which a transmitter establishes certain mean spectral density of thermal radiation. The distinguishing feature of this type of transmission lies in the fact that the thermal radiation has a highest entropy for a specified mean fill ratio (the ratio of spectral density of quantum state to the quantum energy), e. i., the highest intrinsic noise. In order to extract maximum information, the receiver must record photons, i. e., it must measure energy rather than field strength or some other radiation characteristics. Formulas are deduced for the channel carrying capacity depending on signal power. At high power, the carrying capacity increases much slowlier than it would if the channel were ideal. Bibliography of 3 titles. N. S. [Translation of abstract]

SUB CODE: 09, 20

Card 1/1 UDC: 621.391.1:519.2

LEVITIN, L.M., inzhener.

Simplified technical method for making reinforcements. Biul. stroi. tekh. 14 no.3:15-17 Mr '57. (MLRA 10:5)

1. Vsesoyuznoye tsentral'noye normativno-issledovatel'skoye byuro Minmetallurgkhimstroya.
(Reinforced concrete)

AUTHOR: Levitin, L.E. (Engineer) 100-4-2/16

TITLE: Excavation of frozen ground by cutting (Razrabotka merzlogo grunta rezaniyem).

PERIODICAL: "Mekhanizatsiya Stroitel'stva" (Mechanisation of Construction, 1957, Vol.14, No.4, pp.6-9 (USSR).

ABSTRACT: Description of an adapted trench excavator ЭТ-352, for the cutting of frozen ground. The adaptation was carried out by F.F. Kuznetsov, S.N.Malyar and V.P.Liber of the Magnetostroi factory. The arm of the excavator is removed and a special cutter is substituted. This comprises a single or double saw running over 2 driving wheels. The actual cutting is carried out with the aid of miniature "cutters" which form links in the chain of the saw. It takes one hour to execute a 6.4 m long and 1.5 m deep cut. Cutters with double saws are effective in a length of 12.5 m and 1.5 m depth. Steel Ct.4 or Ct.5 is used. The cutting speeds are 0.3-0.96 m/sec and 0.03-0.4 m/sec. The saw can be used for a maximum length of 800-1000 m, depending on the quality of the soil. Technical data are tabulated. The following method was used by the Magnetostroi factory during the 1955 winter for the cutting of frozen soil: the selected areas were broken up to a depth of 30-40 cm to

1/2

Excavation of frozen ground by cutting. (Cont.)

prevent freezing to lower depths. This allowed trenches to be cut to a width of 0.9 m during January. A multi-bucket excavator was used and the breaking up of the soil carried
2/2 out with the plough PL-162A, with tractor C-80.

There are 2 diagrams, 1 table and 1 illustration.

AVAILABLE:

LYUBLINSKIY, K.I., inzh.; LEVITIN, L.G., inzh.

Portable winches for replacing wire rope in mine hoisting equipment. Ugol'.prom. no.3:56-58 My-Je '62. (MIRA 18:3)

1. Dongiprouglemash.

LEVITIN, L.Y.

Pathological ideas on the incontinence of intestinal gases. Zhur. nevr. i psikh. 62 no.1:138-143 '62. (MIRA 15:4)

1. Klinika nevrozov i pogranichnykh sostoyaniy (zav. - doktor med. nauk Ye.K.Yakovleva) i 3-ye psikhiatricheskoye otdeleniye (zav. - prof. Ye.S.Averbukh) Psikhonevrologicheskogo instituta imeni V.M. Bekhtereva (dir. - kand.med.nauk B.A.Lebedev), Leningrad.
(NEUROSES) (FLATULENCE)

LEVITIN, Yefim Alekseyevich; LEVITIN, Leonid Yefimovich; KUBARKINA, L.V., red.; BURLYAND, V.A., red.; BUL'DYAYEV, N.A., tekhn. red.

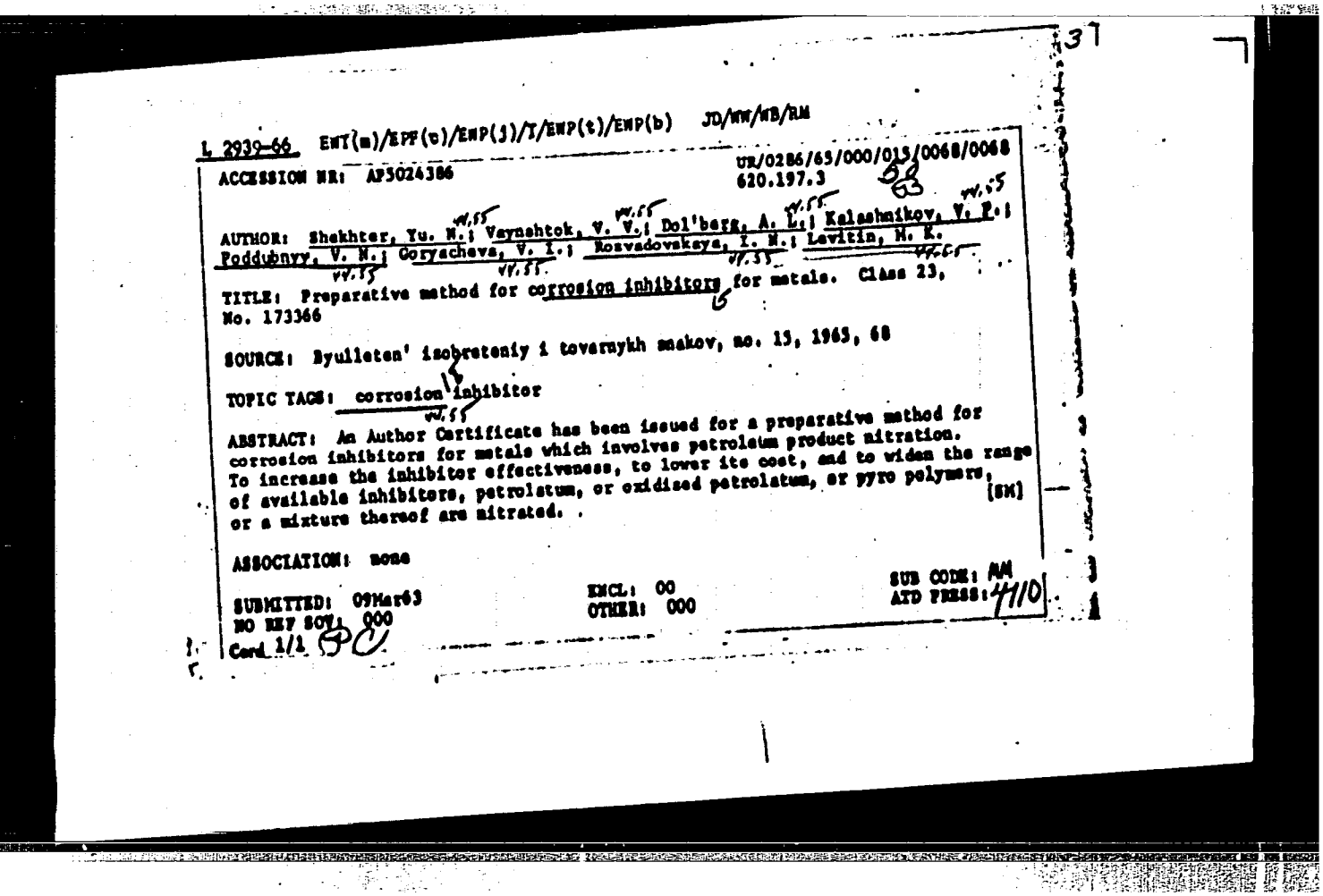
[Electron tubes] Elektronnye lampy. Izd.3., perer. i dop. Pod red. L.V.Kubarkina. Moskva, Izd-vo "Energiia," 1964. 127 p. (Massovaia radiobiblioteka, no.507) (MIRA 17:3)

BOL'SHOV, Yuriy Mikhaylovich; LEVITIN, L.Ye., red.; VORONIN, K.P., tekhn.red.

[Inexpensive transistor radio] Ekonomichnyi priemnik na tranzistorakh. Moskva, Gos.energ.izd-vo, 1960. 31 p. (Massovaia radiobiblioteka, no.371). (MIRA 13:6)
(Transistor radios)

LITVINOV, Sergey Vladimirovich; LEVITIN, L.Ye., red.; LARIONOV, G.Ye., tekhn. red.

[Radio broadcasting equipment at the Exhibition of the Achievements of the National Economy of the U.S.S.R.; exposition of 1960]Radioveshchatel'naia apparatura na VDNKh; ekspozitsiia 1960 g. Moskva, Gosenergoizdat, 1961. 71 p. (Massovaia radiobiblioteka, no.402) (MIRA 15:11)
(Radio--Exhibitions) (Moscow--Exhibitions)



L 2939-66 EWT(m)/EPF(c)/EWP(j)/T/EWP(t)/EWP(b) JD/WW/WB/RM

ACCESSION NR: AP5024386 UR/0286/65/000/015/0068/0068
620.197.3

AUTHOR: Shekhter, Yu. N.; Vaynshtok, V. V.; Dol'berg, A. L.; Kalashnikov, V. P.; Poddubnyy, V. N.; Goryacheva, V. I.; Rozvadovskaya, I. N.; Levitin, M. K.

TITLE: Preparative method for corrosion inhibitors for metals. Class 23, No. 173366

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 15, 1965, 68

TOPIC TAGS: corrosion inhibitor

ABSTRACT: An Author Certificate has been issued for a preparative method for corrosion inhibitors for metals which involves petroleum product nitration. To increase the inhibitor effectiveness, to lower its cost, and to widen the range of available inhibitors, petrolatum, or oxidized petrolatum, or pyro polymers, or a mixture thereof are nitrated. [SM]

ASSOCIATION: none

SUBMITTED: 09Mar63 ENCL: 00 SUB CODE: AM
NO REF SOV: 000 OTHER: 000 ATD PRESS: 4110
Card 1/1

LEVITIN, P.

High labor productivity is most important. Mast.ugl. 3 no.8: 4-5 Ag '54. (MLRA 7:9)
(Coal mines and mining)

LEVITIN, R.

LEVITIN, R., elektrik.

Sandblasting apparatus for cleaning spark plugs. Avt.transp. 32 no.10:36 O '54. (MLRA 7:12)
(Spark plugs)

LEVITIN, R., elektrik.

Brushes for cleaning spark plugs on the road. Avt.transp. 33 no.12: 31 D '55. (MLRA 9:3)

(Spark plugs)

LEVITIN, R.Z.; SHIRNOVA, V.I.

Spectrochemical analysis of the phase content of aluminum in steel. Fiz.sbor. no.4:497-501 '58. (MIRA 12:5)

1. Filial Vsesoyuznogo nauchno-issledovatel'skogo instituta Ministerstva transportnogo mashinostroyeniya SSSR.
(Aluminum--Spectra) (Steel--Analysis)

24.2200
~~24 (8), 24 (3)~~

AUTHORS: Belov, K. P., Levitin, R. Z.

68049
SOV/55-59-3-17/32

TITLE: The Thermodynamic Theory of Antiferromagnetic Transformation

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1959, Nr 3, pp 129 - 133 (USSR)

ABSTRACT: In the simplest case, an antiferromagnetic may be represented as consisting of two sublattices A and B, the specific magnetizations of which, without a field, are of the same value and of opposite direction. For the expansion of the thermodynamic potential near the Curie point

$$\Phi = \Phi_0(T) + \frac{\alpha_1}{2}(\sigma_A^2 + \sigma_B^2) + \alpha_2\sigma_A\sigma_B + \frac{\beta}{4}(\sigma_A^4 + \sigma_B^4) +$$

$$+ \frac{\gamma_1}{2}(\sigma_A^2 + \sigma_B^2)P + \gamma_2\sigma_A\sigma_B P - \frac{\mu}{2}P^2 - H(\sigma_A + \sigma_B)$$

holds in this case in consideration of elastic tensions. Here σ_A and σ_B denote the specific magnetizations of the sublattices, P - pressure; α_1, α_2, and β are the temperature-dependent coefficients;

Card 1/3

4

γ_1 and γ_2 are the magnetostriction constants, μ - the coefficient of elasticity. For reasons of simplicity, magnetic anisotropy is not taken into account. For the magnetization of antiferromagnetics near the Curie point $(\alpha_1 + \gamma_1 P)\sigma_A + (\alpha_2 + \gamma_2 P)\sigma_B + \beta\sigma_A^3 - H = 0$ and $(\alpha_1 + \gamma_1 P)\sigma_B + (\alpha_2 + \gamma_2 P)\sigma_A + \beta\sigma_B^3 - H = 0$ holds. Expressions are then derived for spontaneous magnetization and for the Curie point, for magnetic susceptibility, the discontinuity of specific heat, the spontaneous deformation of the lattice, the discontinuity of thermal dilatation, the discontinuities of the coefficient of compression from all sides, and the ratio between the discontinuities at Curie point. Checking of these relations is rendered difficult because of the lack of experimental data for the quantities ΔC, $\Delta\alpha$, $\Delta\kappa$, etc. for one and the same sample. An approximate evaluation is, however, possible if the published data concerning measurements carried out on various samples are used. As an example, antiferromagnetic CoO is investigated. By using the aforementioned formulas, $\Delta C = 0.25$ kal/g.deg is obtained. For the Curie point shift due

to pressure $d\Theta/dP = 0.16$ deg./(kg/cm^2) holds. Thus, the Curie point of CoO shifts considerably more under the influence of pressure then in the case of ferromagnetics. In an antiferromagnetic $\gamma_1 - \gamma_2 = 3\Theta\alpha'_\Theta \Delta\alpha/\Delta C$ is found for the magnetostriction constant. For the thermodynamic coefficient α'_Θ one finds $\alpha'_\Theta = 0.53.10^2$ g/cm^3.deg. By substitution $\gamma_1 - \gamma_2 = 30.10^{-7}$ erg^{-2} is found. This does, however, not mean that the volume magnetostriction in CoO is also greater than in Invar-alloys. There are 8 references, 4 of which are Soviet.

ASSOCIATION: Kafedra obshchey fiziki dlya biologo-pochvennogo fakul'teta (Chair for General Physics for the Department of Biology and Soil Science)

SUBMITTED: March 3, 1959

4

Card 3/3

24(3)

AUTHORS: Belov, K. P., Levitin, R. Z.

SOV/56-37-2-42/56

TITLE: Magnetostriction of Antiferromagnetic Nickel Monoxide

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 2(8), pp 565-566 (USSR)

ABSTRACT: Information on the magnetostriction of antiferromagnetic substances has hitherto been scarce. It follows from general considerations (existence of a domain structure) that the magnetostriction of antiferromagnetics must be quite considerable and in any case stronger than in ordinary paramagnetics. The magnetostriction of polycrystalline NiO prepared by usual sintering methods was determined. In field not exceeding 7,000 Oe the susceptibility is only weakly dependent upon the field strength and amounts to 6.10^{-6}. The Curie-point was determined from the jump of Young's modulus to be 251°. These results correspond with those obtained by other authors (Ref 1). The magnetostriction was measured by means of a wire transducer, using a photo-electro-optical amplifier. In a diagram the transverse magnetostriction versus temperature function measured in a

Card 1/3

Magnetostriction of Antiferromagnetic Nickel Monoxide

field of 14,200 Oe is given. This magnetostriction is negative and decreases monotonously on approaching Curie-point. In the second diagram the transverse magnetostriction versus field strength function is given for different temperatures, and the longitudinal magnetostriction at room temperature. The latter is positive. A certain "critical" field strength ($H_c \sim 5{,}000$ Oe) below which the magnetostriction is practically zero has been found. Only after surpassing this field strength does the magnetostriction begin to increase. According to the authors' opinion, the magnetostriction in antiferromagnetic nickel monoxide is caused by the existence of a domain structure. This is also indicated by a reduction of the effect with rising temperature and the different signs of the transverse and longitudinal effect. The existence of a critical field strength is, according to the authors, connected with the existence of a coercive force. A reduction of Young's modulus has also been found when a strong magnetic field was applied (antiferromagnetic ΔE effect). This also indicates the occurrence of magnetostriction in antiferromagnetic nickel monoxide. There

SOV/56-37-2-42/56

Magnetostriction of Antiferromagnetic Nickel Monoxide

are 2 figures and 3 references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: May 5, 1959

Card 3/3

BELOV, K.P.; KATAYEV, G.I.; LEVITIN, R.Z.

Internal friction anomalies and modulus of elasticity in ferromagnetic materials near the Curie point. Zhur.eksp.i teor. fiz. 37 no.4:938-943 O '59. (MIRA 13:5)

1. Moskovskiy gosudarstvennyy universitet.
(Magnetism)

LEVIN, B.

PHASE I BOOK EXPLOITATION SOV/4893

Vsesoyuznoye soveshchaniye po fizike, fiziko-khimicheskim svoystvam ferritov i fizicheskim osnovam ikh primeneniya. 3d, Minsk, 1959

Ferrity; fizicheskiye i fiziko-khimicheskiye svoystva. Doklady (Ferrites; Physical and Physicochemical Properties. Reports) Minsk, Izd-vo AN BSSR, 1960. 655 p. Errata slip inserted. 4,000 copies printed.

Sponsoring Agencies: Nauchnyy sovet po magnetizmu AN SSSR. Otdel fiziki tverdogo tela i poluprovodnikov AN BSSR.

Editorial Board: Resp. Ed.: N. N. Sirota, Academician of the Academy of Sciences BSSR; K. P. Belov, Professor; Ye. I. Kondorskiy, Professor; K. M. Polivanov, Professor; R. V. Telesnin, Professor; G. A. Smolenskiy, Professor; N. N. Shol'ts, Candidate of Physical and Mathematical Sciences; E. M. Smolyarenko; and L. A. Bashkirov; Ed. of Publishing House: S. Kholyavskiy; Tech. Ed.: I. Volokhanovich.

PURPOSE: This book is intended for physicists, physical chemists, radio electronics engineers, and technical personnel engaged in the production and use of ferromagnetic materials. It may also be used by students in advanced courses in radio electronics, physics, and physical chemistry.

COVERAGE: The book contains reports presented at the Third All-Union Conference on Ferrites held in Minsk, Belorussian SSR. The reports deal with magnetic transformations, electrical and galvanomagnetic properties of ferrites, studies of the growth of ferrite single crystals, problems in the chemical and physicochemical analysis of ferrites, studies of ferrites having rectangular hysteresis loops and multicomponent ferrite systems exhibiting spontaneous rectangularity, problems in magnetic attraction, highly coercive ferrites, magnetic spectroscopy, ferromagnetic resonance, magneto-optics, physical principles of using ferrite components in electrical circuits, anisotropy of electrical and magnetic properties, etc. The Committee on Magnetism, AS USSR (S. V. Vonsovskiy, Chairman) organized the conference. References accompany individual articles.

Card 4/18

24 4100

S/120/61/000/002/030/042
E032/E114

AUTHOR: Levitin, R.Z.

TITLE: An apparatus for the measurement of the elastic moduli and the internal friction using the "composite vibrator" method

PERIODICAL: Pribory i tekhnika eksperimenta, 1961, No.2, pp.162-163

TEXT: The specimen under investigation is attached to a quartz crystal by means of a suitable adhesive. The quartz crystal carries four electrodes, two of which are used to excite mechanical vibrations and two to measure the piezo-signal (Fig.1). If the natural frequency of the specimen f_s is approximately (to within 5%) equal to the natural frequency of the quartz rod f_q, then the effect of the layer of the adhesive can be ignored and the natural frequency of the composite rod f_0 and the logarithmic decrement δ_0 are related to f_s by the following formulae:

$$m_q f_q \operatorname{tg} \pi f_0/f_q + m_s f_s \operatorname{tg} \pi f_0/f_s = 0 \qquad (1)$$

$$\delta_s = \delta_0 (1 + m_q/m_s) - \delta_q m_q/m_s \qquad (2)$$

Card 1/5

where m_q and m_s are the mass of the quartz and the specimen respectively. The electrical circuit used is shown in Fig.2. Two of the quartz electrodes are connected to the input of a wide-band amplifier and the other two (through a phase-shifter and a cathode follower) to its output. The frequency of oscillations f_a in this feedback circuit is determined by the resonance properties of the composite rod and is equal to the natural frequency f_0 when the phase in the feedback circuit is $\varphi = \pi$. However, it was found that $f_a = f_0$ for all values of φ. A comparison was made (with the aid of scaling circuits) of the number of vibrations in the above system with those produced by a standard oscillator. The frequency could be determined to an accuracy of 0.5 - 1 cps at 10^5 cps. The relative values of the elastic moduli are proportional to the square root of the natural frequency of longitudinal (or torsional) oscillations and could be measured to an accuracy of 0.003%. The errors in the absolute values of the moduli are somewhat greater (of the order of 0.3-0.4%). The ratio V_1/V_2 was measured in order to determine the internal friction (i.e. ratio of the signals across the two pairs of leads). Marx (Ref.8) has shown that the logarithmic

An apparatus for the measurement... decrement is given by:

$$\delta_0 = \frac{k}{f_0(m_q + m_s)} V_1/V_2 \qquad (3)$$

where the coupling coefficient k is characteristic of the quartz and can be calculated from Eq.(2) using known values of V_1/V_2 (without the specimen) and the decrement δ_q for quartz. When measuring the internal friction by the method of damped free oscillations, the feedback circuit is broken by the electronic switch (Fig.2). The oscillations are counted by scaling devices and the number of oscillations Δn for the amplitude to reduce by a factor of 2 is determined. The value of δ_0 is then given by:

$$\delta_0 = \ln 2/\Delta n \qquad (4)$$

The decrement can be determined to an accuracy of 1-2%.

Acknowledgements are expressed to K.P. Belov for directing this work and to G.I. Katayev for valuable advice.

There are 2 figures and 8 references: 5 Soviet and 3 non-Soviet.

ASSOCIATION: Fizicheskiy fakul'tet MGU
(Physics Department, Moscow State University)

LEVITIN, R.Z.; NIKITIN, S.A.

Magnetoelectric and elastic properties of dysprosium.
Fiz. met. i metalloved. 11 no.6:948 Je '61. (MIRA 14:6)

1. Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova.
(Dysprosium—Magnetic properties)

YEVTUSHENKO, L.A.; LEVITIN, R.Z.

Anomalies of the shear modulus in MnO, CoO, Cr_2O_3 antiferromagnetic materials. Fiz. met. i metalloved. 12 no.1:155-157 Jl '61. (MIRA 14:8)

1. Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta. (Ferromagnetism) (Shear (Mechanics))

S/126/61/012/003/019/021
E073/E335

AUTHORS: Goryaga, A.N., Levitin, R.Z. and Lin Chang-ta

TITLE: Anomaly of the Young modulus and internal friction in ferrites with a compensation point

PERIODICAL: Fizika metallov i metallovedeniye v. 12, no. 3, 1961, 458 - 460

TEXT: The authors studied the dependence of the Young modulus and of the internal friction of two ferrites of the following compositions: $Li_2O \cdot 2.7Fe_2O_3 \cdot 2.3Cr_2O_3$ (with the compensation point Θ_k = 371.5 °K) and $Li_2O \cdot 2.5Fe_2O_3 \cdot 2.5Cr_2O_3$ (Θ_k = 326 °K). The Yound modulus E and the internal friction Q^{-1} were measured by a method described by I.R. Zacharias (Ref. 9 - Phys. Rev., 1933, 44, 116), using a frequency of 130 kc/s. Fig. 1a show the temperature dependence of the Young modulus E, dyne/cm^2 x 10^{-11} in the demagnetized state, i.e, for H = 0 and at saturation, i.e. H = 2 690 Oe. It can be seen that, at the compensation point, the Young modulus

Card 1/3

decreases and this phenomenon is particularly pronounced if an electric field (H = 2 690 Oe) is applied. The maximum of internal friction occurs at the same temperature but its magnitude is almost independent of the field (Fig. 1δ, shows the internal friction Q^{-1} versus temperature, °K). The temperature dependence of the ΔE effect in a saturation field of the same ferrite is shown in Fig. 2. This effect decreases at the compensation point, which is obviously associated with a reduction in the role of the processes of technical magnetization on approaching the compensation temperature. The fact that the ΔE effect differs from 0 at Θ_k is attributed to the incomplete compensation of the spontaneous magnetization of the sub-lattices. Similar temperature dependences of E, Q^{-1} and of the ΔE effect were also obtained for the ferrite of the composition $LiH_2O \cdot 2.5Fe_2O_3 \cdot 2.5Cr_2O_3$.

The authors attribute the anomalies of the elastic properties to the fact that, at the compensation temperature, the ferrite

Anomaly of the ....

becomes a compensated antiferromagnetic due to the magnetic moments of the sub-lattices being compensated. It is pointed out that at about 250 °K a maximum of internal friction is observed which ceases on applying a field, indicating that this maximum is associated with domain phenomena. Measurement of the magnetization at various temperatures has shown that the maximum occurs in a range of the steepest decrease of spontaneous magnetization on approaching the Θ_k point. Acknowledgments are expressed to K.P. Belov for directing the work.
There are 2 figures and 10 references: 5 Soviet-bloc and 5 non-Soviet-bloc. The four latest English-language references mentioned are: Ref. 1 - W. Gorter, Philips Res. Report, 1954, 9, 295; Ref. 6 - I.S. Van Wieringen - Phys. Rev., 1953, 90, 488; Ref. 7 - M.E. Fine - Phys. Rev., 1952, 87, 1143 and Ref. 8 - R. Street, B. Lewis - Phil. Mag., 1956, 1, 663.

ASSOCIATION: Moskovskiy gosuniversitet im. M.V. Lomonosova
(Moscow State University im. M.V. Lomonosov)

SUBMITTED: March 13, 1961

Card 3/3

30071
S/048/61/025/011/016/031
B104/B102

24.7500 (also 1144)

AUTHORS: Belov, K. P., Levitin, R. Z., and Nikitin, S. A.

TITLE: Magnetoelastic properties of terbium and holmium

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 25, no. 11, 1961, 1382 - 1384

TEXT: The temperature dependences of the magnetic properties of Dy, Tb, Tu, Er, and Gd have a complex character. While being ferromagnetic at low temperatures, they pass over, at a specific temperature θ_1, into the antiferromagnetic state with the Curie temperature θ_2. The antiferromagnetic state between θ_1 and θ_2 can be easily destroyed by an outer magnetic field. For Tb $\theta_1 = 223^\circ K$ and $\theta_2 \approx 234^\circ K$. The antiferromagnetic is destroyed by a field of about 200 oersteds. Below $230^\circ K$ the modulus of elasticity E displays a strong anomaly and the inner friction has a maximum at $225^\circ K$ (Fig. 1). At the temperatures θ_2 and θ_1 this anomaly passes through a maximum and a minimum, respectively. Longitudinal and transverse magnetostriction of Tb were measured at different temperatures as a function of the

Card 1/A3

30071
S/048/61/025/011/016/031
B104/B102

Magnetoelastic properties of...

field strength ($\lambda \approx 750 \cdot 10^{-6}$ at 15 koe). The temperature dependence of the modulus of elasticity and of internal friction of Ho was examined near $\theta_c = 196^{\circ}K$ only (Fig. 3). The shear modulus, too, is anomalous in Ho. This proves that not only a pure bulk deformation occurs with the θ_2 transition. As for Dy, it is known that below θ_2 the axial ratio of the unit cell changes $\lambda \approx 1000 \cdot 10^{-6}$ at 15 koe. Neutron diffraction studies showed that Dy in the antiferromagnetic range (above θ_1) has a so-called helicoidal spin structure: the spins are helicoidally arranged in the lattice. It is believed that other rare-earth metals, particularly Ho and Tb, also possess this spin structure. There are 3 figures and 6 references: 3 Soviet and 3 non-Soviet. The three references to English-language publications read as follows: Thoburn W., Legvold S., Spedding F., Phys. Rev., 112, 56 (1958); Bamister I. R., Legvold S., Spedding F., Phys. Rev., 94, 1140 (1954); Koehler W., Wollan E., Lecture delivered at a seminary on rare earths elements, USA, California, October 1960.

ASSOCIATION: Fizicheskiy fakul'tet Moskovskogo gos. universiteta im. M. V. Lomonosova (Physics Division of Moscow State University imeni M. V. Lomonosov)

Card 2/4 3

25182
S/056/61/040/006/003/031
B102/B214

24,7900

AUTHORS: Belov, K. P., Levitin, R.Z., Nikitin, S. A., Ped'ko, A. V.

TITLE: The magnetic and magneto-elastic properties of dysprosium and gadolinium

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 40, no. 6, 1961, 1562 - 1569

TEXT: The interest that is being recently taken in the study of the magnetic properties of rare earths and their alloys is due to the following two causes: a) In some rare earth metals (Dy, Ho, Er, Tb, Tu) there occur complicated magnetic transformations from ferro magnetic to antiferromagnetic and then to the paramagnetic; b) In some rare earths there are uncompensated electron spins in a shell which is screened by outer 5s and 5p electrons. For this reason the direct exchange interaction between the 4f electrons is very difficult or even impossible. The authors have carried out measurements with the greatest possible accuracy on magnetization, magnetostriction λ, elastic modulus E, and the inner friction

Card 1/9

25132
S/056/61/040/006/003/031
B102/B214

The magnetic and magneto-elastic properties of ...

Q^{-1} of Dy and Gd and obtained them as functions of temperature. The present paper is concerned with the results of these experiments. The measurements were carried near the points Θ_1 and Θ_2 and in the region between them (Θ_1 is the temperature of the ferromagnetic - antiferromagnetic transition, and Θ_2 that of the antiferromagnetic paramagnetic transition). The results of the investigations are represented graphically. For Dy, Θ_1 was found to be 88°K and Θ_2 175°K. The character of the anomalies of E and Q^{-1} for Dy at Θ_2 is the same as in the antiferromagnetic $Cr_2\Theta_3$, i. e. Θ_2 is the Neel point. The behavior near Θ_1 is entirely different: The magnetic field has a strong effect on the Young's modulus E (Δ E effect) as well as on Q^{-1}, the changes of these quantities being irreversible.

Card 2/9

The magnetic and magneto-elastic properties of ..

This means hystereses. These are shown for ΔE and Q^{-1} for 85° K in Figs. 2 and 3. All this signifies that Θ_1 is not a phase transition point of the second kind, and is in no way related to structural transformations. Fig. 4 shows the temperature dependence of Dy which shows particular peculiarities near Θ_1. Firstly, the magnetostriction at this point is unusually high (10^{-3} at 15,000 Oe), and secondly, it is anisotropic. Moreover, there is for each temperature a critical value H_k at which a sudden rise of λ begins. Gadolinium whose ferromagnetism was discovered early has always been considered as a "normal" ferromagnetic. However, the authors have discovered that in weak fields there are anomalies in the temperature behavior of magnetization (Fig. 6), coercive force H_c (Fig. 7), and residual magnetization (Fig. 8). It may thus be concluded that a temperature exists for Gd (similar to the 217°C point for Ni and the 294°C point for Co) at which a temperature anomaly of μ and H_c exists. Contrary, however, to Ni and Co, Gd shows two singularities in the behavior of magnetic properties near the Curie point (Θ=290.5°K). The curvature of the curve show-

Card 3/9

25182
S/056/61/040/006/003/031
B102/B214

The magnetic and magneto-elastic proper-
ties of ...

ing the decrease of magnetization with temperature is very small and can be determined from the formula: $(\sigma_s/\sigma_0)^2 = \zeta(1-T/\Theta)$. For Ni and Fe $\zeta = 6 - 7$; for Gd: $\zeta = 1.17$. Such a small ζ-value is characteristic of ferrite and some alloys (cf. Table). The existence of anomalous behavior of Gd (as compared to Ni and Fe) near Θ is due to the presence of an antiferromagnetic phase in this region of temperature, which, however, can be destroyed by weak fields. The authors thank Professor Ye. M. Savitskiy, V. F. Terekhova and I. V. Burov for preparing the Gd sample and A. S. Borovik-Romanov for discussions. There are 12 figures, 1 table, and 12 references: 4 Soviet-bloc and 8 non-Soviet-bloc. The most important references to English-language publications read as follows: J. Elliot et al. Phys. Rev. 94, 1143, 1954; D. Behrendt et al. Phys. Rev. 109, 1544, 1958.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

Card 4/9

LEVITIN, R. Z., NIKITIN, S. A., PEDKO, A. V., and BELOV, K. P.,

"Magnetoelastic Properties of Rare Earth Ferromagnets"

report presented at the Symposium on Ferroelectricity and Ferromagnetism, Leningrad, 30 May-5 June 1963.

ZHEGUNOV, Yu.P.; KADOMTSEVA, A.M.; LEVITIN, R.Z.

Use of the ponderomotive method in measuring the magnetization of pulsed magnetic fields. Prib. i tekh. eksp. 9 no.3: 157-159 My-Je '64 (MIRA 18:1)

1. Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta.

BELOV, K.P.; LEVITIN, R.Z.; NIKITIN, S.A.

Ferromagnetism and antiferromagnetism in rare-earth metals.
Usp. fiz. nauk 82 no.3:449-498 Mr '64. (MIRA 17:4)

ACCESSION NR: AP4023400 S/0048/64/028/003/0519/0528

AUTHOR: Belov,K.P.; Levitin,R.Z.; Nikitin,S.A.; Pod'ko,A.V.

TITLE: Magnetoelastic properties of rare earth ferromagnetic materials /Report, Symposium on Ferromagnetism and Ferroelectricity held in Leningrad 30 May to 5 June 1963/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no.3, 1964, 519-528

TOPIC TAGS: magnetostriction, rare earth magnetostriction, magnetoelasticity, rare earth magnetoelasticity, rare earth exchange anisotropy, helical antiferromagnetism

ABSTRACT: The magnetostriction, the temperature dependence of the elastic moduli, and the effect of hydrostatic pressure on the magnetization, are discussed in some detail for a number of rare earths. The experimental data for the discussion are taken from a number of sources. These magnetoelastic properties are of interest because they involve a combination of exchange and magnetic interactions, and their behavior may shed some light on the complex magnetic properties of these materials. In the range of temperatures and fields in which the materials are ferromagnetic, the magnetostriction constants of Dy and Tb are large, and the two constants (for

Card 1/3

the same material) are of opposite sign. The magnetostriction is due primarily to rotation of the magnetic moment in the basal plane against magnetic anisotropy forces. The magnetostrictive behavior of Gd is very complex and is not understood. In the range of temperatures and fields in which Dy exhibits helical antiferromagnetism its magnetostrictive behavior is complex. A simple theory of magnetostriction is developed, in which the magnetic anisotropy in the basal plane is neglected (presumably a reasonable approximation in the temperature range considered) and the exchange interactions between neighboring basal planes and between next-neighboring basal planes are assumed to be different linear functions of the strain in the hexagonal axis (i.e.; of the distance between the basal planes). This theory accounts qualitatively for the complex behavior observed. Unlike the behavior of magnetostriction in the iron group, the magnetostriction of Dy and Tb is anisotropic even very close to the Curie point. This indicates that the exchange interaction in these materials is anisotropic. The anisotropy of the exchange interaction is also indicated by the fact that the shear modulus of Dy has the same type of anomaly at the Curie point as has Young's modulus. The ferromagnetic-antiferromagnetic transition point of Dy is shifted to lower temperatures by the application of hydrostatic pressure. The transition of polycrystalline Gd at 210°C behaves similarly. After a short thermo-

ACCESSION NR: AP4023400

dynamic discussion it is concluded from this that the exchange interaction between the basal planes (i.e., along the hexagonal axis) depends sharply on distance. This, and other properties of the exchange interaction revealed by magnetoelastic behavior, is not easy to understand on the basis of current theories, according to which the exchange interaction in these materials is indirect, via the conduction electrons and the $6s^2$ and $5p^6$ bands. Orig.art.has: 10 formulas and 6 figures.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet (Moscow State University)

SUBMITTED: 00 DATE ACQ: 10Apr64 ENCL: 00

SUB CODE: PH NR REF SOV: 007 OTHER: 014

Card 3/3

ACCESSION NR: AP4041041 S/0120/64/000/003/0157/0159

AUTHOR: Zhegunov, Yu. P.; Kadomtseva, A. M.; Levitin, R. Z.

TITLE: Measuring magnetization in strong impulse magnetic fields by a ponderomotor method

SOURCE: Pribory* i tekhnika eksperimenta, no. 3, 1964, 157-159

TOPIC TAGS: magnetization measurement, intensity of magnetization, ponderomotor magnetization measurement

ABSTRACT: A method is suggested for measuring the intensity of magnetization in small (10—100 mg) specimens, such as single crystals, in strong (up to 300 kilo-oerst.) magnetic fields by the force pulling the specimen into a nonuniform magnetic field. The impulse field is built up in a bronze coil through which a 1,500-microfarad capacitor bank is discharged from an initial voltage of 5 kv. A specimen fastened by means of a thin porcelain rod to an electromagnetic-sensor

Card 1/2

ACCESSION NR: AP4041041

diaphragm was introduced into the coil field. A tiny probe coil placed near the specimen served for measuring the field strength. Emf's from both these sources were recorded on a 2-beam cathode-ray oscillograph, and the oscillogram was used for plotting a field-strength vs. intensity-of-magnetization curve. The error of magnetization measurement is claimed to be 10%. "The authors are deeply grateful to K. P. Belov for his constant interest in the work, and to S. F. Litvinenko for aligning the impulse-magnetic-field outfit." Orig. art. has: 4 figures and 8 formulas.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 06Jul63 ENCL: 00

SUB CODE: EM NO REF SOV: 001 OTHER: 003

Card 2/2

ACCESSION NR: AP4034061 S/0126/64/017/004/0617/0619

AUTHORS: Belov, K. P.; Levitin, R. Z.; Malevskaya, L. A.; Sokolov, V. I.

TITLE: Anomalies of Young's modulus in rare earth ferromagnets

SOURCE: Fizika metallov i metallovedeniye, v. 17, no. 4, 1964, 617-619

TOPIC TAGS: rare earth, ferromagnet, Young modulus, dysprosium, erbium, holmium, thulium, helicoidal ferromagnetic structure, paramagnetism

ABSTRACT: Rare earth ferromagnets (Dy, Er, Ho, Tb, Tu, and possibly Gd) at certain temperature intervals possess antiferromagnetic helicoidal structures. To investigate the reasons for the formation of these structures, the Young's modulus was measured at various temperatures. A compound vibrator was used at a frequency of 150 kilocycles/sec, and the temperature was changed continuously from 4.2 to 78K by placing the specimen in a massive copper vessel which could be cooled down to a temperature near that of liquid helium. Further variation of temperature between 78 and 300K was obtained by using liquid nitrogen and an electric heater. The magnetization was measured by means of an oscillating magnetometer. The results showed three regions in which anomalous behavior of the Young's modulus could be observed: 1) a region around which a transition took place from antiferromagnetism

Card 1/2

ACCESSION NR: AP4034061

to paramagnetism (here the value of the Young's modulus decreased); 2) a region corresponding to a transition from ferromagnetism to antiferromagnetism (here the Young's modulus fell significantly); 3) a region between these two temperatures which corresponded to the helicoidal antiferromagnetic structure (here the Young's modulus increased faster than in the paramagnetic region as the temperature was decreased). Orig. art. has: 2 figures.

ASSOCIATION: Moskovskiy gosuniversitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 13Jul63 ENCL: 00

SUB CODE: SS, MM NO REF SOV: 004 OTHER: 003

Card 2/2

ACCESSION NR: AP4042559 S/0056/64/046/006/2003/2010

AUTHOR: Zakharov, A. I.; Kadomtseva, A. M.; Levitin, R. Z.; Ponyatovskiy, Ye. G.

TITLE: Magnetic and magnetoelastic properties of a metamagnetic iron-rhodium alloy

SOURCE: Zh. eksper. i teor. fiz., v. 46, no. 6, 1964, 2003-2010

TOPIC TAGS: magnetostriction, alloy Young modulus, alloy lattice parameter, ferromagnetic transition temperature, Curie point, iron rhodium alloy, alloy magnetization, alloy

ABSTRACT: The temperature dependences of the magnetization, magnetostriction, Young modulus, and lattice constant of an iron-rhodium alloy of close to equiatomic ($Fe_{0.5}$, $Rh_{0.5}$) composition have been investigated in the 50—750K temperature range. The experiments were conducted on vacuum-melted Fe-Rh alloy annealed at 1100C for 5 hr and then furnace cooled or water quenched from 1100C. In a field up to 2000 oe, the annealed alloy was antiferromagnetic at room temperature, with the transition to the ferromagnetic state occurring in a

Card 1/3

ACCESSION NR: AP4042559

field of 1700 oe at 350K with heating and at 352K with cooling. The Curie point of the alloy, determined in a 9-oe field, was about 660K. The transition temperature T_k was found to decrease by about 12K, with the field increasing to 14,500 oe. Isothermal curves for the magnetization in fields up to 140 koe showed that below the critical temperature T_k, the magnetization increases sharply in certain critical fields H_k, i.e., the antiferromagnetic-to-ferromagnetic transition occurs under the action of the field. The critical field H_k, defined as the field magnitude at which the most rapid increase in magnetization occurs, decreases linearly with increasing temperature at a rate of 0.0017 oe/deg. The lattice parameter increases gradually with the temperature increase to T_k = 353K, at which a new ferromagnetic phase is formed whose lattice parameter increases abruptly by 0.3%. Above the Curie point (θ = 660K), the lattice parameter increases with temperature more rapidly than in the ferromagnetic region. With an increasing hydrostatic pressure, the transition temperatures, both in heating and cooling, increase approximately linearly at a rate of 0.00433 deg/atm. The Young modulus exhibits a sharp increase at the point of transition from the antiferromagnetic to the ferromagnetic state. The longitudinal magnetostriction λ and the relative change

Card 2/3

ACCESSION NR: AP4042559

of Young modulus ΔE/E are zero in the antiferromagnetic region but are at a maximum in the region of temperature transition. The maximum probably results from the superimposition of magnetoelastic effects, which are associated with the destruction of the antiferromagnetic structure under the action of the field, on the ordinary ΔE and magnetostriction effects which are caused by domain processes. The use of the data obtained for determining the applicability of the C. Kittel theory to ferromagnetism — antiferromagnetism transition in the Fe—Rh alloy produced inconclusive results — and further research on the alloy is recommended. Orig. art. has: 8 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: 18Jan64	ATD PRESS: 3068	ENCL: 00
SUB CODE: MM,SS	NO REF SOV: 006	OTHER: 009

Card 3/3

ACCESSION NR: AP4024574 S/0053/64/082/003/0449/0498

AUTHORS: Belov, K. P.; Levitin, R. Z., Nikitin, S. A.

TITLE: Ferromagnetism and antiferromagnetism of rare earth metals

SOURCE: Uspekhi fizicheskikh nauk, v. 82, no. 3, 1964, 449-498

TOPIC TAGS: ferromagnetism, antiferromagnetism, rare earth metal, yttrium subgroup, iron group, exchange interaction, electron shell

ABSTRACT: In view of the recent discovery that the rare earth metals of the yttrium subgroup have ferromagnetic properties different from those of ferromagnets of the iron group, and in view of the large amount of experimental data accumulated in recent years on these magnetic properties and the interest in helicoidal antiferromagnetism, the author describes and interprets systematically this material. It is shown that the rare earth ferromagnets have a more complicated magnetic behavior than those of the iron group. In view

Card 1/3

ACCESSION NR: AP4024574

of this, a simple application of the theories originally developed for iron-group magnets cannot be directly applied to rare-earth ferromagnets and may lead to wrong results. It is concluded that the theory of exchange and magnetic interactions in rare-earth ferromagnets must be based on the fact that the magnetic 4f-electrons of the latter lie deep in the electron shells. The mechanism for the exchange interaction between the 4f electrons and the neighboring atoms, which must of necessity be indirect, should be the subject of further study. The section headings are: 1. Magnetic properties of rare-earth ferromagnets. 2. Neutron diffraction studies of the magnetic structure of rare-earth ferromagents. 3. Study of the helicoidal magnetic structure. 4. Nature of the magnetic phase transitions in rare-earth ferromagnets. 5. Antiferromagnetism of metals in the cerium subgroup. 6. Magnetoelastic properties of rare earth ferromagnets. 7. Electrical and galvanomagnetic properties of rare-earth alloys. Orig. art. has: 53 figures, 35 formulas, and 2 tables.

Card 2/3

ZAKHAROV, A.I.; KOTOMINA, A.M.; IZVEKOV, R.Z.; PONYATOVSKIY, V.G.

Magnetic and magnetoelastic properties of the ma[illegible] alloy iron-rhenium. Zhur.eksper. i teor.fiz. 46 no.6:2003-2010 Je '64.

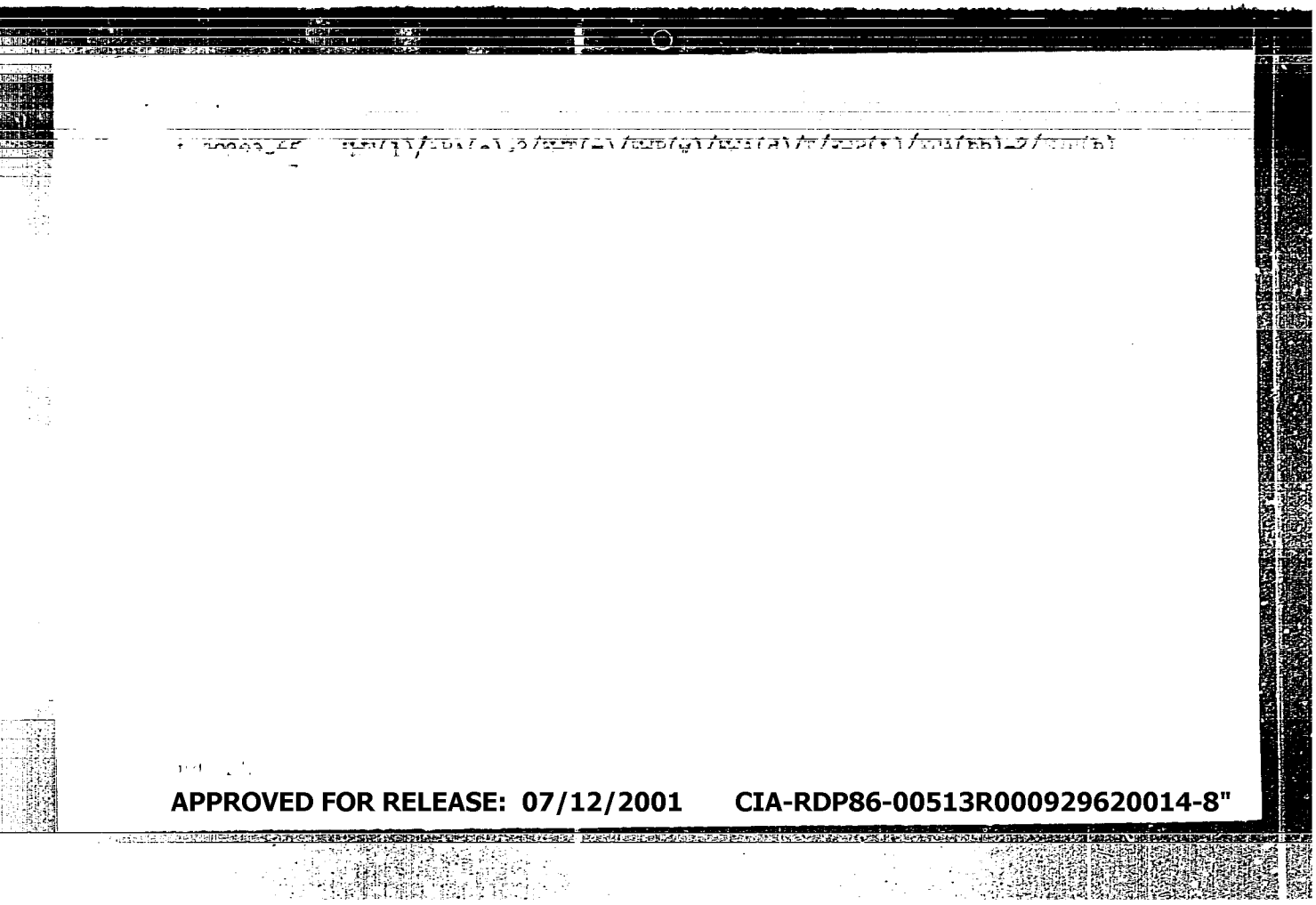
1. Moskovskiy gosudarstvennyy universitet.

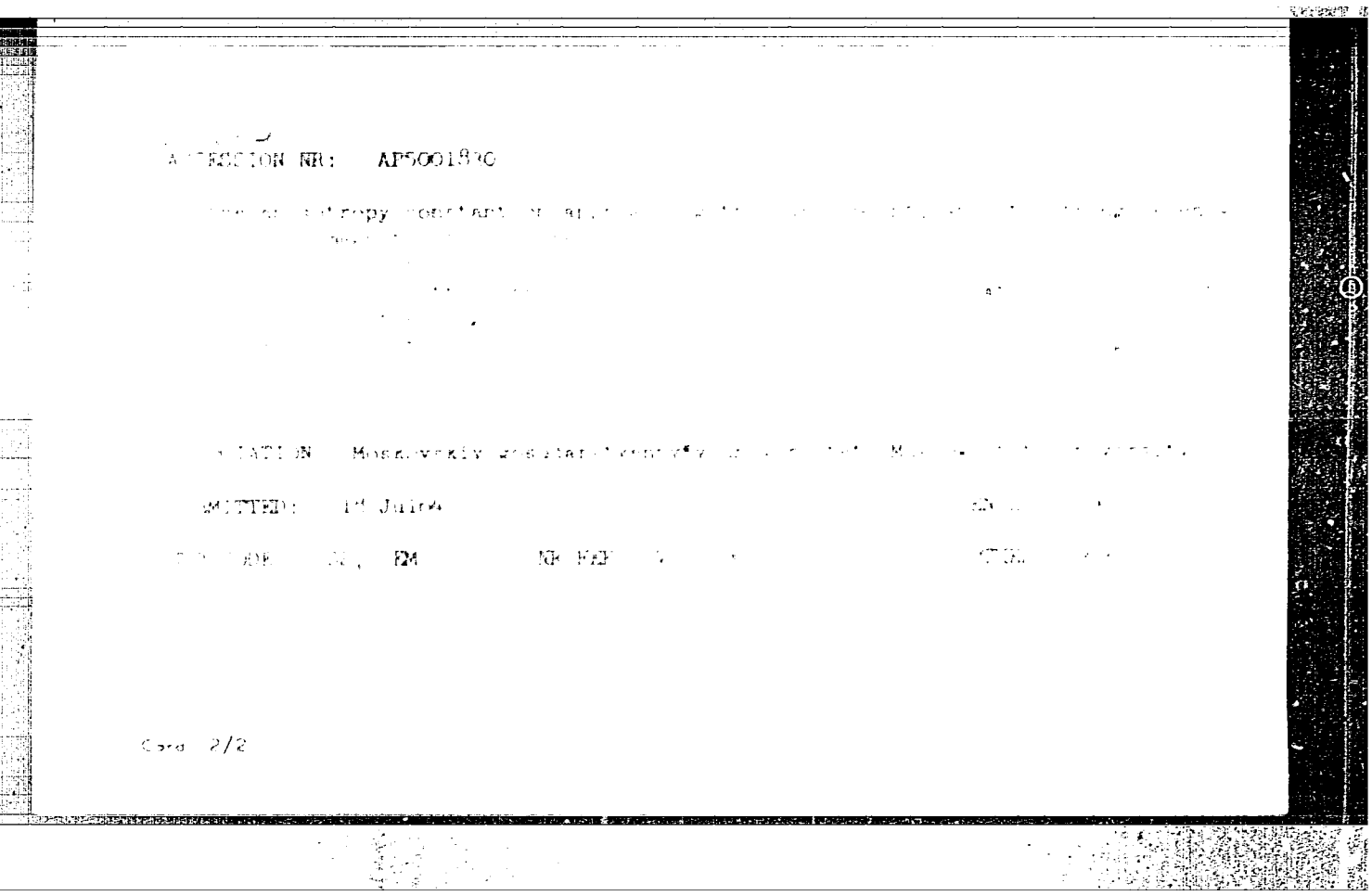
(MIRA 17:10)

BELOV, K.P.; KADOMTSEVA, A.M.; LEVITIN, R.Z.

Magnetic susceptibility of orthoferrites of rare earth elements in strong magnetic fields. Zhur. eksp. i teor. fiz. 47 no.2:439-443 Ag '64. (MIRA 17:10)

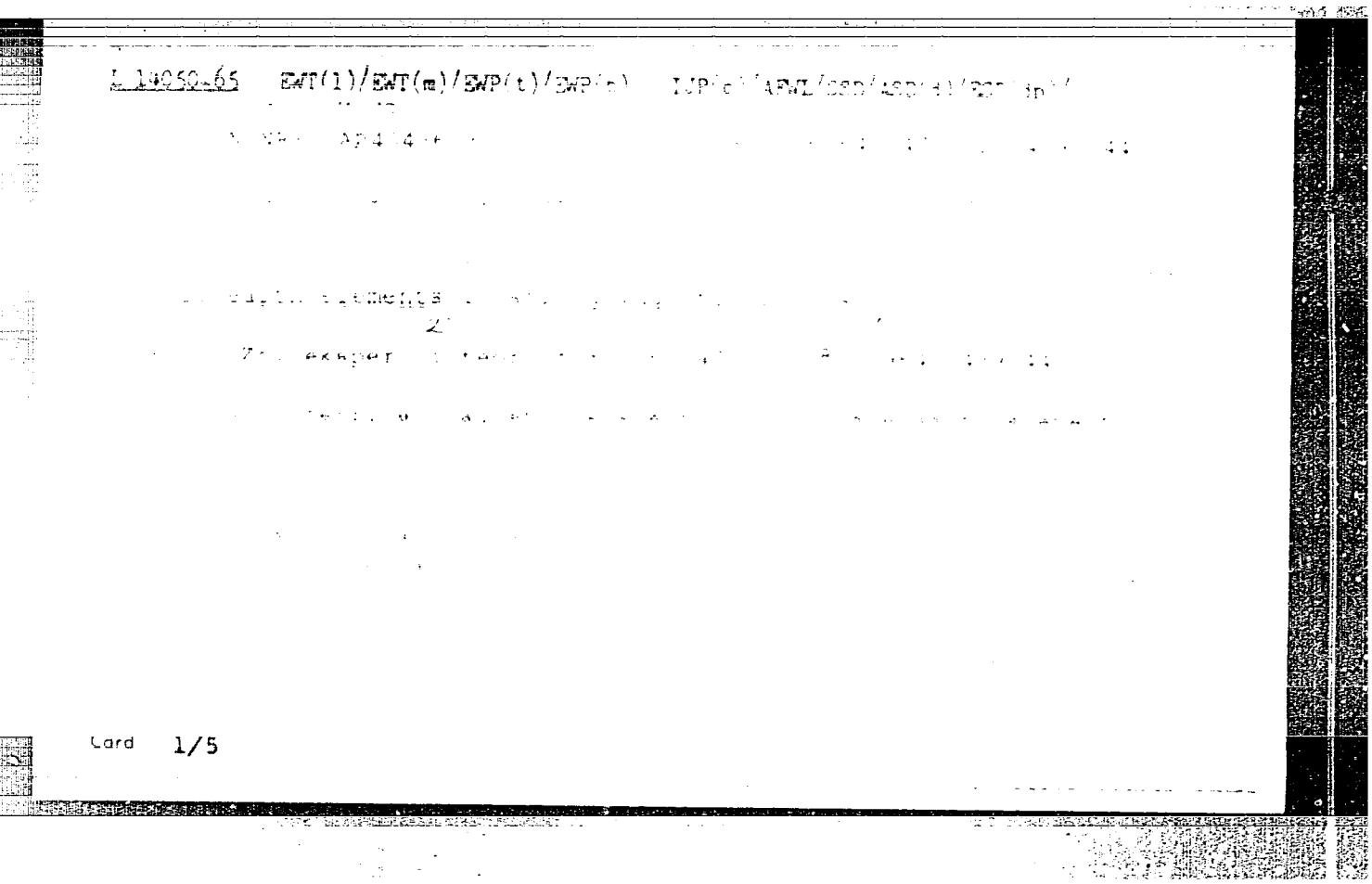
1. Moskovskiy gosudarstvennyy universitet.





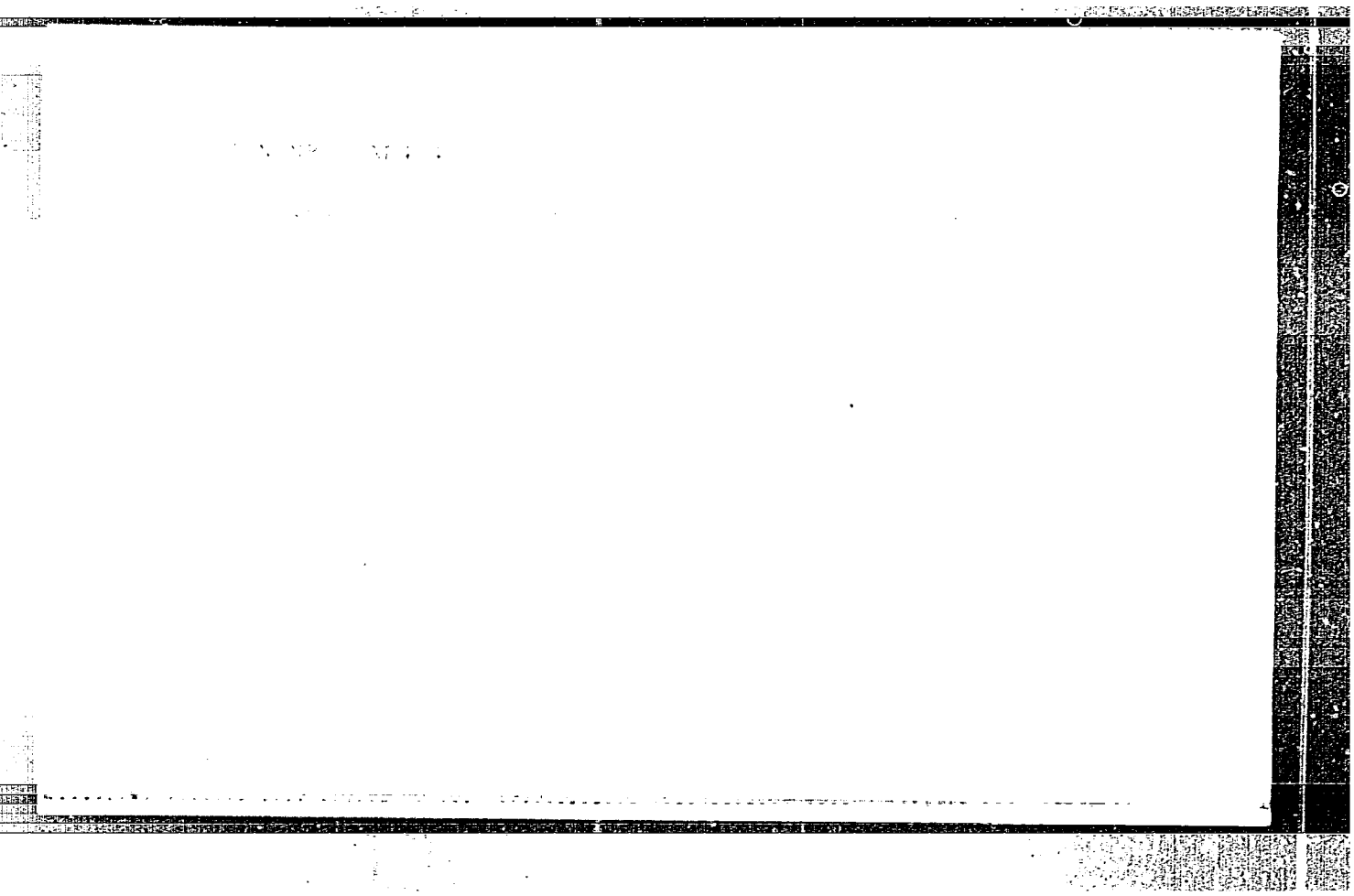
ACCESSION NR: AP5001890

Card 2/2

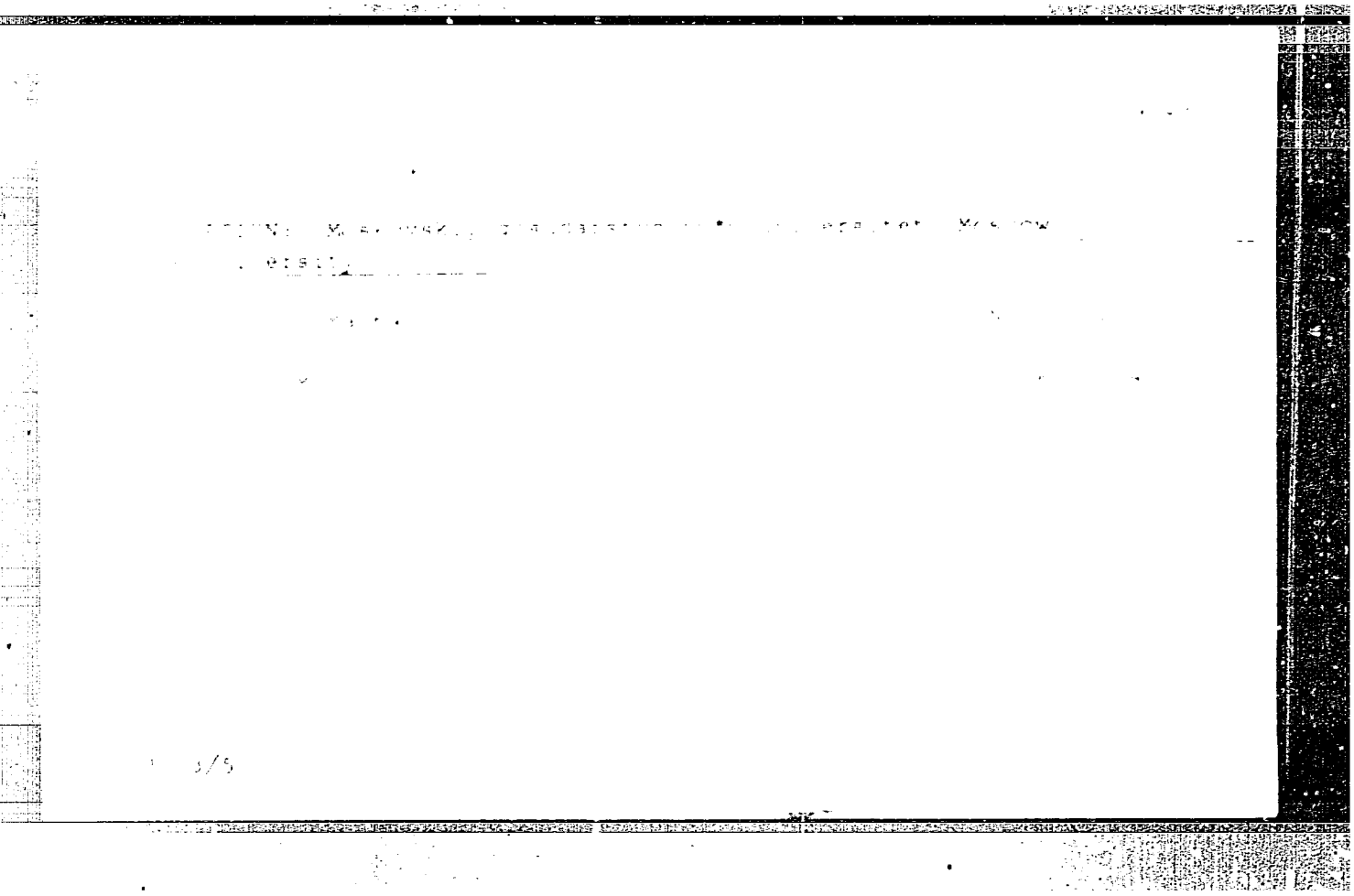


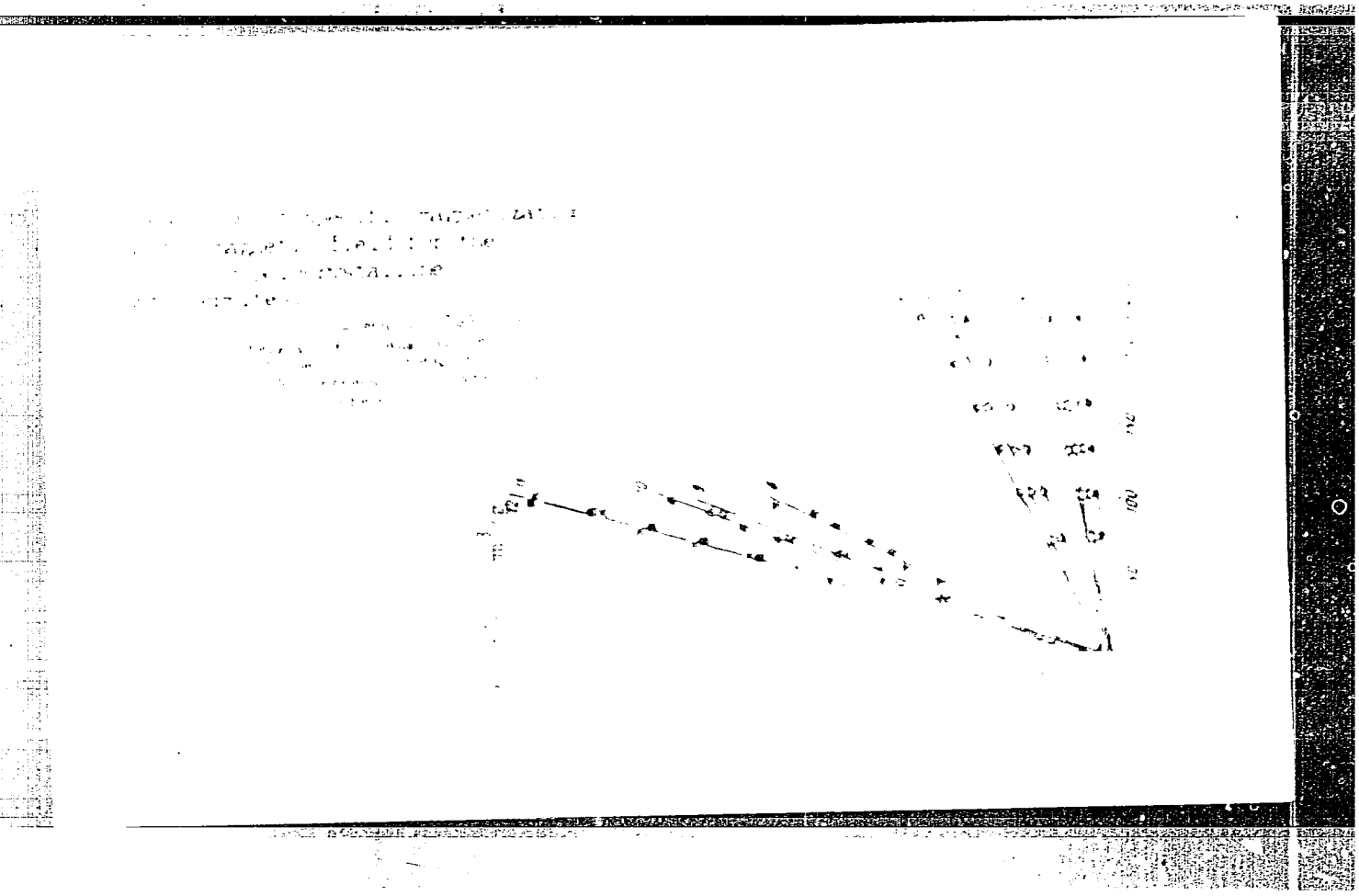
L 10650-65 EWT(l)/EWT(m)/EWP(t)/EWP(b) IJP(c) APWL/ASD/ASD(f)/RAEM(b)/

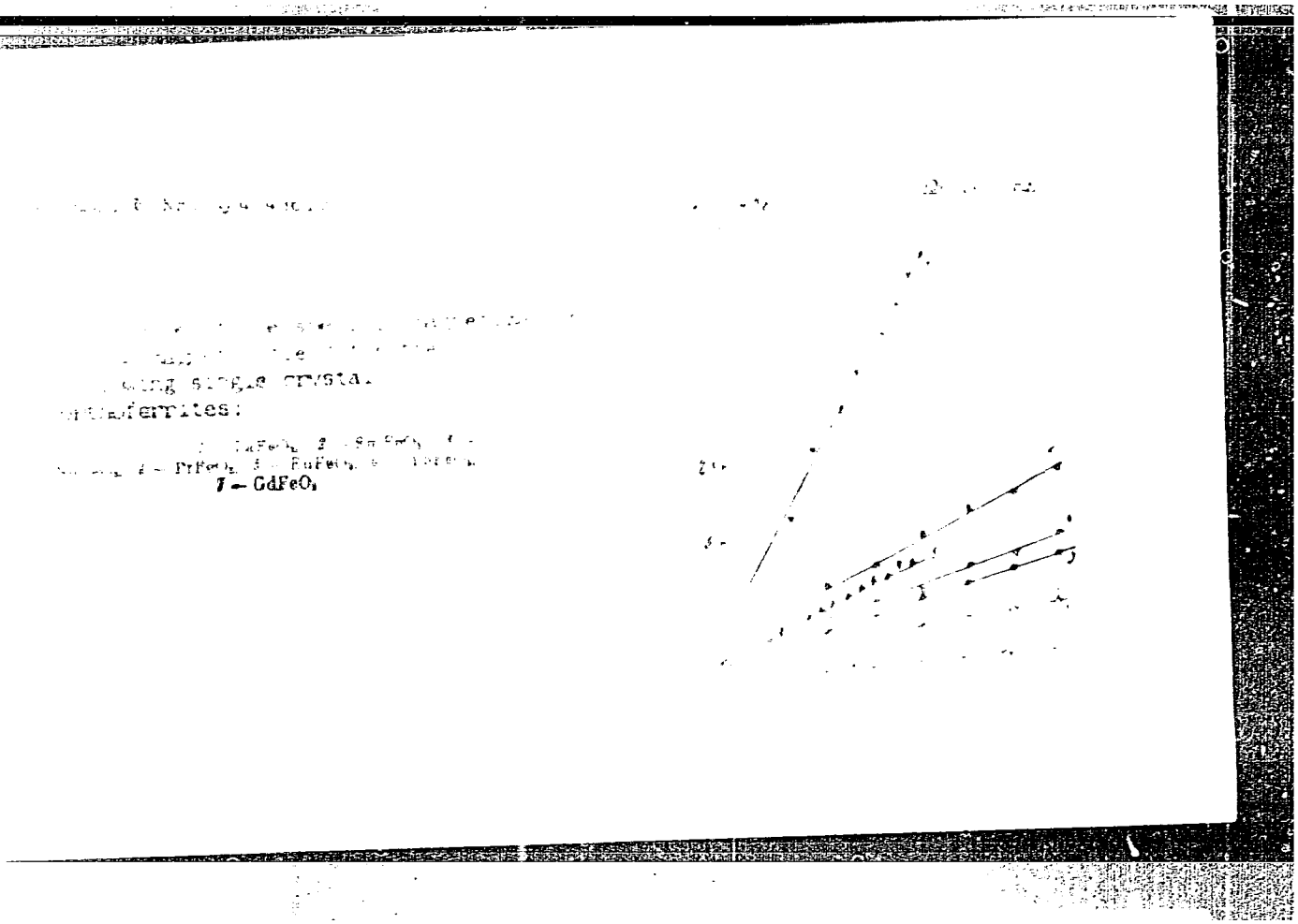
Card 1/5



APPROVED FOR RELEASE: 07/12/2001 CIA-RDP86-00513R000929620014-8"







BELOV, K.A.; LEVITIN, R.Z.; [illegible]

Magnetostriction of rare earth metals in the paramagnetic, antiferromagnetic, and ferromagnetic regions. Zhur. eksp. i teor. fiz. 49 no.6:1733-1740 D '65.

1. Moskovskiy gosudarstvennyy universitet.

July 15, 1965.

BELOV, Konstantin Petrovich; BELYANCHIKOVA, Marianna Aleksandrovna; LEVITIN, Rudol'f Zinov'yevich; NIKITIN, Sergey Aleksandrovich; GUSEV, A.K., red.

[Rare-earth ferromagnetics and antiferromagnetics] Redkozemel'nye ferromagnetiki i antiferromagnetiki. Moskva, Nauka, 1965. 319 p. (MIRA 19:1)

L 23166-66 EWT(m)/EWP(t) IJP(c) JD/JG

ACC NR: AP6002712 SOURCE CODE: UR/0056/65/049/006/1733/1740

AUTHOR: Belov, K. P.; Levitin, R. Z.; Ponomarev, B. K.

ORG: Moscow State University (Moskovskiy gosudarstvennyy universitet)

TITLE: Magnetostriction of rare-earth metals in the paramagnetic, antiferromagnetic, and ferromagnetic ranges

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 6, 1965, 1733-1740

TOPIC TAGS: rare earth metal, terbium, dysprosium, holmium, erbium, magnetostriction, paramagnetism, antiferromagnetism, ferromagnetism, pulsed magnetic field

ABSTRACT: The magnetostriction of polycrystalline Tb, Dy, Ho, and Er was measured in pulsed magnetic fields up to 150 koe in the temperature interval 90 to 300K. In earlier investigations the saturation magnetostriction was measured only in individual easy directions. In this investigation, the magnetostriction was also measured below the magnetic-ordering temperature. The measurement was by means of a remote piezoelectric sensor, which will be described elsewhere. The temperature was maintained constant within ±0.3K, and the temperature gradient along the sample did not exceed 2K. The relative strain was measured with accuracy 3 to 5% and its

Card 1/2

L 23166-66

ACC NR: AP6002712

absolute value with accuracy 10 to 12%. A large magnetostriction (of the order of 100 x 10^{-6}) was observed in all metals in the paramagnetic region. In Ho, magnetostriction due to the transition from the antiferromagnetic to the ferromagnetic state was observed. In the ferromagnetic state, the magnetostriction of Tb and Dy reaches values of 3300 x 10^{-6} and 2200 x 10^{-6}, respectively. In Tb and Dy the magnetostriction was measured only in fields above the critical value for the transition from the helicoidal to the ferromagnetic state (0.2 and 10 koe for Tb and Dy). The magnetostriction of all three metals was positive, in contrast with the case of Er, where it was negative. Orig. art. has: 9 figures and 10 formulas.

SUB CODE: 20/ SUBM DATE: 15Jul65/ ORIG REF: 007/ OTH REF: 008

Card 2/2 UDC

L 07102-67 EWT(l)/EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP6029114 SOURCE CODE: UR/0048/66/030/006/0981/0983

47
44
B

AUTHOR: Levitin, R.Z.; Ponomarev, B.K.

ORG: none

TITLE: Contribution of the magnetoelastic energy to the uniaxial magnetic anisotropy energy of dysprosium /Report, All-Union Conference on the Physics of Ferro- and Antiferromagnetism held 2-7 July 1965 in Sverdlovsk/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya. v. 30, no. 6, 1966, 981-983

TOPIC TAGS: rare earth, dysprosium, magnetostriction, magnetic anisotropy

ABSTRACT: The authors have measured the magnetostriction of dysprosium single crystals in a hard magnetization direction (the c axis) in pulsed fields up to 150 kOe at temperatures from 129 to 300° K in order to test the hypothesis of A.Clark, B.DeSavage, and R.Bozorth (Phys. Rev., A. 138, 216 (1965)) that the large uniaxial magnetic anisotropy of dysprosium is due to magnetostrictive interaction. The magnetostriction was found to vary quadratically with the field in the paramagnetic region (above 178° K) and to reach values of the order of 3×10^{-3}. At lower temperatures the magnetostriction increased rapidly and reached the enormous value of 0.7×10^{-2} at 129° K in a 150 kOe field, where it was still far from saturated. Possible reasons for the large magnetostriction are discussed briefly, and it is concluded that dysprosium has a helicoidal magnetic structure at temperatures between 85 and 178° K. The

Card 1/2

L 07102-67

ACC NR: AP6029114

3

magnetoelastic and uniaxial magnetic anisotropy energies of dysprosium are compared, and it is shown that the former is an appreciable fraction of the latter. It is concluded that the magnetoelastic interaction must be taken into account in any theory of the magnetic anisotropy of the rare earth metals. The magnetostriction measurements in pulsed fields at temperatures below 129° K were not well reproducible; this is ascribed magnetostrictive deformation of the specimens beyond their elastic limits. The authors thank K.P.Belov for his interest and valuable advice. Orig. art. has: 3 formulas and 1 table.

SUB CODE: 20 SUBM DATE: 00 ORIG. REF: 003 OTH REF: 006

Card 2/2

ACC NR: AP6022028 SOURCE CODE: UR/0120/66/000/003/0188/0190

AUTHOR: Ponomarev, B. K.; Levitin, R. Z.

ORG: Physics Department, MGU (Fizicheskiy fakul'tet MGU)

TITLE: Measurement of magnetostriction in strong pulsed magnetic fields

SOURCE: Pribory i tekhnika eksperimenta, no. 3, 1966, 188-190

TOPIC TAGS: magnetostriction, electronic measurement, pulsed magnetic field

ABSTRACT: A method for measuring magnetostriction in strong magnetic fields ranging from 150 to 200 kOe with a piezoelectric transducer is described. The pulsed magnetic field is created by discharging a large capacitor (C = 3000 μf, V_{max} = 5 v) through a solenoid; this set-up established magnetic fields of 150 to 200 kOe with pulse durations of 10 msec. The piezoelectric transducer consists of two rings made from TsTS-19 polarized piezoceramic (outside and inside diameters, 23 and 4 mm; thickness, 1 mm). The specimen under study is cylindrically-shaped with approximate length and diameter of 1 cm and 1 mm; with such dimensions the nonuniformity of the magnetic field does not exceed 5% throughout the specimen. Sensitivity to deformation of the transducer is 1.24 ± 0.10 v/μ; the overall sensitivity of the set-up is (6.0±0.5) 10^{-7} cm/mm of the recording oscillograph scale. The overall accuracy of determining absolute values of magnetostriction in pulsed magnetic fields is 13%. In conclusion, the authors thank K. P. Belov for constant interest in the work, N. I. Shpin'kov and

Card 1/2 UDC: 621.317.795:538.652

ACC NR: AP6022028

G. I. Katayev for valuable advice, V. I. Sokolov and Yu. V. Yergin for measuring the magnetostriction in static fields. Orig. art. has: 3 figures.

SUB CODE: 20/ SUBM DATE: 09Feb65/ ORIG REF: 001/ OTH REF: 002

Card 2/2

ACC NR: AM6000480 Monograph UR/

Belov, Konstantin Petrovich; Belyanchikova, Marianna Aleksandrovna; Levitin, Rudol'f Zinov'yevich; Nikitin, Sergey Aleksandrovich

Rare-earth ferromagnets and antiferromagnets (Redkozemel'nyye ferromagnetiki i antiferromagnetiki) Moscow, Izd-vo "Nauka", 1965, 319 p. illus., biblio. 4,000 copies printed.

Series note: Sovremennyye problemy fiziki

TOPIC TAGS: rare earth metal, ferromagnetic material, antiferromagnetic material, ferromagnetism, ferrite, antiferromagnetism

PURPOSE AND COVERAGE: Based on the published Soviet and foreign works of students and engineers, a survey is given of the present state of theoretical and experimental studies of ferromagnetism and antiferromagnetism of rare earth metals, alloys and compounds. Also shown are the results obtained by the author. This book is recommended for scientists working with magnetism and solid physics as well as for physicists, chemists, and engineers in research and application of magnetic materials. It can also be useful to aspirants and students in advanced courses of related specialties.

Card 1/2 UDC: 538.221

ACC NR: AM6008489

TABLE OF CONTENTS (abridged):

SUB CODE: 20, 11 SUBM DATE: 07Dec65/ ORIG REF: 113/ OTH REF: 382/

Card 2/2

ACC NR: AP6036167 SOURCE CODE: UR/0188/66/000/005/0116/0118

AUTHOR: Levitin, R. Z.; Popov, Yu. F.

ORG: Department of General Physics for Biologists (Kafedra obshchey fiziki dlya biologov)

TITLE: The ΔE effect of the antiferromagnets NiO and CoO in strong pulsed magnetic fields

SOURCE: Moscow. Universitet. Vestnik. Seriya III. Fizika, astronomiya, no. 5, 1966, 116-118

TOPIC TAGS: antiferromagnetic material, nickel compound, cobalt compound, oxide, critical magnetic field

ABSTRACT: Inasmuch as earlier experimental investigations of the ΔE effect in antiferromagnets were limited to fields below the critical value, the authors describe a procedure for measuring the ΔE effect in pulsed magnetic fields and present results obtained in fields comparable with the critical field. The pulsed field was produced by discharging a capacitor bank through a solenoid. Fields up to 150 kOe with pulse duration 7 - 10 msec could be produced. The ΔE effect was measured with apparatus based on the resonant compound-oscillator method. The measurements were made at frequencies 150 - 200 kcs and in fields with durations 7 - 10 msec. The ΔE effect was measured at different temperatures from 293 to 170K, using liquid nitrogen for cooling. The results show that the ΔE effect of NiO is positive and increases rapidly

Card 1/2 UDC: 538.65

ACC NR: AP6036167

with increasing field. At T = 293K the ΔE effect growth slows down in fields 130 - 150 kOe. In the case of CoO, the ΔE effect also has a strong field dependence. At T = 258K and in fields of ~50 kOe, the ΔE effect reverses sign. It was impossible to measure the ΔE effect of CoO in fields stronger than 50 - 70 kOe, because of a sharp increase in Young's modulus. The results are in agreement with the theory, except for the ΔE effect of NiO in fields of 130 - 150 kOe at 293K. This is attributed to saturation of the "domain" ΔE effect. The domain effect may also be the reason why the ΔE effect could not be observed in strong fields in CoO at the Neel point (293K). It is concluded that measurements of single-crystal multidomain samples are necessary to explain the nature of the ΔE effect observed in cubic antiferromagnets. The authors thank Professor K. P. Belov for valuable advice and a discussion of the results. Orig. art. has: 3 figures and 3 formulas.

SUB CODE: 20/ SUBM DATE: 14Jan65/ ORIG REF: 004/ OTH REF: 001

Card 2/2

ACC NR: AP6037056 SOURCE CODE: UR/0056/66/051/005/1306/1310

AUTHOR: Belov, K. P.; Kadomtseva, A. M.; Levitin, R. Z.

ORG: Moscow State University (Moskovskiy gosudarstvennyy universitet)

TITLE: Character of the magnetization curves for a single crystal of samarium orthoferrite near the reorientation temperature

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, V. 51, no. 5, 1966, 1306-1310

TOPIC TAGS: magnetization curve, single crystal growing, samarium, ferrite, reorientation temperature, Curie point, magnetic moment, pulsed magnetic field

ABSTRACT: Magnetization curves of a single crystal of samarium orthoferrite have been measured from room temperature to the Curie point. Reorientation of a magnetic moment in a crystal of samarium orthoferrite from the a axis to the c axis was observed on heating to 210C. In the temperature 150—300C the threshold fields of this compound do not exceed 20 koe and, in the first approximation, increase linearly on removal from the reorientation temperature. The measurements made in pulse magnetic fields showed that the threshold field of samarium orthoferrite is 50—60 koe at room temperature, while for europium and

ACC NR: AP6037056

yitterbium orthoferrites the value of the threshold field exceeds 200 koe. The experimental magnetization curves near the reorientation temperature coincide well with the calculated values. The authors wish to express their appreciation to V. A. Timofeyeva for growing the single crystal orthoferrites. Orig. art. has: 7 figures and 6 formulas. [Authors' abstract] [AM]

SUB CODE: 20/ SUBM DATE: 31May66/ ORIG REF: 005/

Card 2/2

ACC NR: AP7003203 SOURCE CODE: UR/0056/66/051/006/1634/1638

AUTHOR: Belov, K. P.; Levitin, R. Z.; Ponomarev, B. K.

ORG: Moscow State University (Moskovskiy gosudarstvennyy universitet)

TITLE: Magnetic and magnetostriction properties of an erbium single crystal in the paramagnetic region

SOURCE: Zh eksper i teor fiz, v. 51, no. 6, 1966, 1634-1638

TOPIC TAGS: erbium, magnetic property, magnetostriction, magnetization, magnetic anisotropy

ABSTRACT: This is a continuation of earlier work (ZhETF v. 49, 1734, 1965), where it was shown that polycrystalline samples of terbium, dysprosium, and holmium have relatively large positive magnetostriction in strong magnetic fields, whereas erbium has a much lower and negative magnetostriction. The present article deals with measurements of the magnetostriction, magnetization, and torque of an erbium single crystal in pulsed magnetic fields up to 150 kOe. The measurements were made by procedures described elsewhere (PTE no. 3, 188, 1966). The magnetization was determined by a ponderomotive method. The torque was measured with a piezoelectric pickup. The results show that in the paramagnetic region (between 90 and 300K), the magnetostriction of erbium is very high and anisotropic. It was positive along the hexagonal axis and negative perpendicular to it. Its value reached 240 x 10^{-6} at 220K in a field of 150 kOe (150° higher than the point of transition to a magnetically ordered

Card 1/2

ACC NR: AP7003203

state). The temperature dependence of the magnetostriction is shown to be due entirely to the temperature dependence of the paramagnetic magnetization. The authors thank Professor Ye. M. Savitskiy, V. F. Terekhov, and V. Ye. Kolesnikov for supplying the erbium single crystal. Orig. art. has: 5 figures.

SUB CODE: 20/ SUBM DATE: 01Jul66/ ORIG REF: 003/ OTH REF: 004

Card 2/2

LEVITIN, S.

Poultry plants must remain independent enterprises. Mias.ind.SSSR. 32 no.6:43-44 '61. (MIRA 15:2)

1. Kiyevskiy myasotrest.
(Poultry plants)

LEVITIN, S.

Profitableness of sausage manufacture. Mias.ind.SSSR 33 no.2:36-37 '62. (MIRA 15:5)

1. Kiyevskiy mezhoblastnoy myasotrest.
(Sausages)

LEVITIN, S.; MALIN, N.

New finishing equipment at the Exhibition of Achievements of the National Economy of the U.S.S.R. Stroitel' 9 no.2:20-21,23-26 F '63. (MIRA 16:2)
(Finishes and finishing—Equipment and supplies)

SHMYREV, Aleksandr Nestorovich; MORENSHIL'DT, Vera Aleksandrovna; IL'INA, Sof'ya Glebovna; FATEYEV, A.V., doktor tekhn. nauk, prof., retsenzent; KHOLODILIN, A.N., kand. tekhn. nauk, retsenzent; LEVITIN, S.G., inzh., retsenzent; GERASIMOV, A.V., kand.tekhn.nauk, nauch.red.; CHERTKOV, R.I., kand.fiz.-mat.nauk, nauch.red.; KAZAKOV, Yu.S., red.; ERASTOVA, N.V., tekhn.red.

[Ship stabilizers] Uspokoiteli kachki sudov. Leningrad, Gos.soiuznoe izd-vo sudostroit. promyshl., 1961. 515 p. (MIRA 14:12)
(Stability of ships)

LEVITIN, S.G., inzh.; TEMKIN, M.S., inzh.

Problems of designing roll stabilizers with maneuverable lateral fins before preliminary ship drawings. Sudostroenie 27 no.9:18-21 S '61. (MIRA 14:11)
(Stability of ships)

LEVITIN, S. L.

"The Problem of the Clinical Aspects and Diagnosis of Phlegmonous Gastritis," Klin. Med., 27, No. 11, 1949.

Mor., 3rd Surgical Clinic, Inst. First Aid im. N. V. Sklifosovskiy, -c1949-.

LEVITIN, S.L.

Sun and heat stroke. Med. sestra, Moskva no.7:23-27 July 1951. (CIML 20:11)

1. Author is a physician.

[redacted], S. L.

Tissues - Foreign Bodies

Foreign bodies in tissues. Med. sestra No. 7, 1953.

Monthly List of Russian Accessions, Library of Congress
June 1953. UNCL.

LEVITIN, S.

Metodology of calculating the production cost of poultry meat. Mias.ind.SSSR 25 no.2:45-50 '54. (MLRA 7:5)

1. Ukrglavptitseprom. (Poultry industry)

LEVITIN, S.L.

Diagnosis of diseases and injuries of persons in an intoxicated state. Sov.med. 21 no.3:116-120 Mr '57. (MLRA 10:7)

1. Iz Moskovskogo gorodskogo nauchno-issledovatel'skogo instituta skoroy pomoshchi imeni Sklifosovskogo (dir. - zasluzhennyy vrach USSR M.M.Tarasov) i Moskovskoy gorodskoy stantsii skoroy pomoshchi (nachal'nik - zasluzhennyy vrach RSFSR A.F.Shvedov)

(ALCOHOLIC INTOXICATION, compl.
differ. diag. of inj. in intoxicated state)
(WOUNDS AND INJURIES, differ. diag.
in alcoholic intoxication)

LEVITIN, S.

Cost of poultry processing in meat combines is high. Mias. ind. SSSR 28 no.5:51-52 '57. (MIRA 11:1)

1. Ptitsetrest Kiyevskogo sovnarkhoza.
(Poultry plants--Costs)

9(2) PHASE I BOOK EXPLOITATION SOV/1722

Nadezhnost' radioelektronnoy apparatury; sbornik statey (Reliability of Electronic Equipment; Collection of Articles) Moscow, Izd-vo "Sovetskoye radio," 1958. 144 p. Number of copies printed not given.

Compiler: I.V. Grushin; Ed.: V.G. Masharova; Tech. Ed.: A.A. Sveshnikov.

PURPOSE: The book may be useful to engineering personnel working with electronic equipment.

COVERAGE: The authors discuss the necessity of determining the reliability of component elements of various electronic systems and describe methods of calculating the probability of faults in trigger circuits, amplifiers, rectifiers, and other vacuum-tube devices. No personalities are mentioned. References appear at the end of all but one article.

TABLE OF CONTENTS:

Card 1/4

the reliability of operation of such standard elements as trigger circuits, pulse-forming circuits, pulse rectifiers, phase inverters, cathode followers, diodes, and amplifiers with pulse delay. There are 3 references, all Soviet.

Babenko, A.A. Reliability Parameters of Electronic Equipment 131
The author discusses the probability of the occurrence of faults in electronic equipment and explains the necessity of determining the reliability of various components. There are no references.

AVAILABLE: Library of Congress (TK780.N3)

JJ/lsb
7-6-59

AUTHOR: Levitin, S. M. SOV/57-58-8-17/37

TITLE: On the Problem of the Influence of the Electric Field in a Cathode on Its Electron Emission (K voprosu o vliyanii elektricheskogo polya v katode na yego elektronnuyu emissiyu)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1958, Nr 8, pp. 1714 - 1716 (USSR)

ABSTRACT: This is a generalized study of the influence of the electric field in the surface layers of a cathode on the emission of thermal electrons, when a current passes through the electrode. This study is based upon an analysis of the evidence presented in reference 1. In reference 1, no account was taken of the asymmetric part of the distribution function $f_1(p,\xi)$ as compared to the spherical symmetrical part $f_0(p,\xi)$ in the deduction of formula (1). By this approximation the direction of the field looses its importance. The only really important fact is that this field passes through the cathode surface layer. The temperature of the electron gas is increased under the influence of the field generated around and in the cathode by the passage of a current through it. The direction of

Card 1/2